CPC/CTB *Seminar*

11:00am-12:00pm, 16 July 2015

Climate Prediction Center/NOAA Climate Test Bed Seminar Series

Speaker:
Prof. Chung-Hsiun Sui
Dept. of Atmospheric Sciences
National Taiwan University, Taipei, Taiwan

Time:
11:00am-12:00pm, 16 July 2015

Location:
National Center for Weather and Climate Prediction, Conference Room 2155
5830 University Research Court
College Park, MD 20740

Remote Access:
https://www1.gotomeeting.com/join/714576893
Meeting ID: 714-576-893
Conference call: 1-877-680-3341
Passcode: 858747

Contact:
Jin Huang, Director
NOAA Climate Test Bed
NOAA's National Weather Service

Moistening Processes for Madden-Julian Oscillations

A scale-separated moisture budget is calculated using the EC Interim reanalysis for the years 1982-2011. Each budget term is projected onto the intraseasonal moisture anomaly and its time tendency change at equatorial Indian Ocean. The projections and composite life cycle of the budget terms indicate that broad-scale advection by low-frequency and MJO flow and moisture fields are dominant moisture sources, while residual of moisture budget ($-Q_2$) as dominant sink contributing to tendency term (propagation) and intaseasonal moisture anomaly (growth and decay). The pre-moistening in the low-troposphere by boundary-layer moisture convergence leading the deep convection is observed but only in the cloud developing to convective phase of MJOs. A budget analysis for the two MJOs over the Indian Ocean in Oct. and Nov. 2011 by using the special DYNAMO observations. The two MJOs exhibit different budget balances in pre-moistening stage from the suppressed phase to cloud developing phase when low-frequency vertical motion is downward (drying) in MJO1 but upward (moistening) in MJO2 that are balanced by negative Q_2 (re-evaporation in non-raining cloud) in MJO1 and positive Q_2 in MJO2. Nonlinear moisture advection by synoptic disturbances causes moistening in the suppress phase of the two MJOs. The above result reveals two moistening processes for the initiation of MJO over Indian Ocean: moistening by synoptic-scale or low-frequency easterly winds, or by shallow convection in large-scale suppressed condition; The two are being examined by numerical simulations using the Model for Prediction Across Scales (MPAS) that is collaboratively developed, primarily by NCAR and LANL/DOE based on global nonhydrostatic framework using Voronoi Meshes, and a cloud resolving model, respectively.